



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management  
DIVISION OF SITE REMEDIATION  
291 Promenade Street  
Providence, R.I. 02908-5767

1 November 1995

Mr. Philip Otis, P.E., Remedial Project Manager  
US Department of the Navy, Northern Division  
Code 18, Mail Stop #82  
10 Industrial Highway  
Lester, PA 19113-2090

RE: Revised Draft, IR Program Site 09, Allen Harbor Landfill  
Phase III Remedial Investigation for the  
Management of Migration Operable Unit, August 1995  
Submitted 28 August 1995

Dear Mr. Otis;

The Rhode Island Department of Environmental Management (RIDEM), Division of Site Remediation has reviewed the above referenced document and has generated the attached comments.

If you have any questions or require additional information please call me at (401) 277 3872 ext. 7138.

Sincerely,

Richard Gottlieb, P.E.  
Principal Sanitary Engineer

Attachment:

cc: W. Angell, DEM DSR  
C. Williams, EPA Region 1

**REVISED DRAFT IR PROGRAM SITE 09  
ALLEN HARBOR LANDFILL  
PHASE III REMEDIAL INVESTIGATION FOR THE  
MANAGEMENT OF MIGRATION OPERABLE UNIT**

**General Comments:**

1. Data interpretation/evaluation is lacking in this document. In order for the project to progress toward remedy selection (whole site), it is important that interpretation of the voluminous amounts of data collected over the three phases of investigation be conducted at this point. This document fails to adequately to so.
2. During the fall of 1993, groundwater tables throughout the state were seriously low; concurrently, leachate samples were collected from the landfill and toxicity tests were performed. The results of this toxicity testing indicated that these saline seep water samples were more toxic than the fresh water seeps sampled during the spring and summer months of that year. An evaluation of whether the groundwater table in the fall of 1993 was low enough to simulate the disappearance of a "fresh water lens" and to whether the elimination of fresh water recharge to the lens will create a more toxic discharge to the harbor needs to be conducted. Such an occurrence would further substantiate the need for groundwater containment.
3. Under the present geohydrolic conditions, fresh and saline waters have most likely achieved a state of equilibrium, fluctuating with seasonal weather, storm and tidal events. The Phase III RI should determine the potential effect on the freshwater/saltwater interface as well as any potential impact to the groundwater quality caused by the placement of an impermeable cap over the fill area. Insight into this issue will assist us in evaluating potential remedial alternatives for shallow groundwater.
4. Using a properly calibrated model, elevations resulting from a 24 hour and 25 year storm should be determined. This information will be assist us in the remedy selection process as well as the remedial design. Also, the RI should include an existing surface contour map. Water levels under the above listed storm events should be superimposed over that surface contour map.
5. The association between shallow ground water quality and potential impacts to the environment have not been adequately demonstrated. Evaluation of the available data should be sufficient in determining if impacts at the shore line are attributable to surface water runoff and wind deposition of contaminated soils from the top and face of the landfill.

6. The final submission should include color coded profiles depicting the water table, the geohydrolic units, and contaminant fate and transport routes, cross sections need to be extended from the western wetlands (other side of Sanford Road) to the harbor.

**Specific Comments:**

7. **Title:**

The Navy, EPA, and RIDEM agreed in June 1995 that Allen Harbor Landfill would be completed as a whole site remedy rather than as two separate operable units. Please revise the title of this document to reflect this.

8. **Page ES-4,5 & 6, Hydrogeology;  
Layers 1 and 3.**

The following comments were made on the previous submittal of this document and were not addressed in this submittal:

- Based on the assumptions that the fill material may be significantly more porous than the silty sand and that 25% of the total amount of waste placed in the landfill has been estimated to be located below the water table, the State has questions concerning the accuracy of modeling the fill and silty sand as one unit (ie: does leachate discharge directly from the fill out to the harbor or must it travel down through the silty sand unit). Please provide some discussion as to why the Navy feels the fill material and sandy silt can be modeled as one unit.
- The data has confirmed that the gray silt unit and till unit respond like a confined aquifer. A discussion of how this aspect of site geohydrology relates to the overall migration potential for groundwater contamination needs to be included here.
- The ground water model used does not factor in chemical gradients between the groundwater/harbor interface. Please discuss this aspect and its' significance or insignificance to the hydrogeology at Allen Harbor.
- Since this is a public document the reader may be lead to conclude that there are two confined aquifers (Layer 2 and Layer 3). A figure delineating the aquifers in relation to the layers would be helpful.

9. **Page ES-6, Fill/Silty Sand Combined Unit;  
Paragraph 1.**

Please state the datum used for the well depths.

- 10. Page 1-1, Section 1.1, Background, Objective, and Scope; Paragraph 2, Sentence 1.**

This sentence states that Site 09 has been divided into two operable units for investigation/remediation. Please see comment number 8.

- 11. Page 1-9, Section 1.2.4.2, Marine Ecological Risk Assessment: Paragraph 2, Last Sentence.**

*"Toxicity testing showed negative impacts due to both surface runoff and in sediment adjacent to the landfill and were not seasonally dependent."*

In the Phase II Allen Harbor Risk Assessment Pilot Study, seep water samples were taken and analyzed. Toxicity testing was performed. There was an indication that seep water toxicity was seasonally dependant. The text should be clarified to indicate if the Navy is suggesting that seep water is not impacting sediments adjacent to the landfill.

- 12. Pages 2-8 and 9, Section 2.1.4.3, Well installation; Bentonite and Grout Seals:**

The report should state if the water from the Base water supply system was tested prior to use. Based on experiences at Sites 02 & 03, this supply contained low level VOC contamination.

- 13. Page 3-11, Section 3.7.6.2, Tidal Efficiencies of Different Layers; Paragraph 2, Last Sentence.**

The aquifers being modeled were fresh water during the monitoring events, yet in calculating ( $TE_{app}$ ) the Navy found it necessary to correct for the density of seawater. The report should explain why this correction was necessary.

- 14. Page 4-1, Section 4.2, Potential VOC Sources;**

*"Landfills create a natural reducing chemical environment..."*

In general landfills exist under anaerobic conditions. This paragraph states that VOC's will degrade more readily under anaerobic conditions. Most VOC's degrade more readily under aerobic conditions; however, halogenated compounds may be an exception.

At the time of initial placement of waste, air is mixed into the fill. Aerobic conditions create a rapid initial breakdown. This condition is short-lived and anaerobic conditions quickly take over. In general, decomposition is faster under aerobic than anaerobic conditions.

The most recent research into biodegradation indicates that certain halogenated compounds will degrade under anaerobic conditions. If Navy is suggesting that the chlorinated compounds are naturally attenuating (the increase in Vinyl Chloride between Phase II and Phase III sampling events could suggest this) far more evaluation than is presented in this document is required. The data needs interpretation and the interpretation needs to be documented within the body of this report.

Specifically, and as previously commented on by the Division, twice daily tidal fluctuations of the water table displaces air voids initially at the saturated/unsaturated interface. As the water table rises and falls into and out of the voids, the air/gasses are displaced and replaced. The volume of air exchanged, may be significant enough to create aerobic conditions within the landfill.

Aerobic/anaerobic conditions at the ground water table needs to be evaluated. Further, if degradation of halogens is occurring, some thought must be given to what happens at the groundwater/harbor interface(s). In evaluating the fate of chlorinated solvents at and near these interfaces, consideration must be given to groundwater flow rates and microbial degradation rates as well as the oxygenating effects of wave action and near-shore salt water intrusion.

In summary, landfills normally exist under anaerobic conditions; however, the data indicates that Allen Harbor Landfill may be atypical. Twice daily tidal fluctuations of the water table displaces soil gasses in voids initially at the saturated/unsaturated interface. As the water table rises and falls into and out of the voids, the air/gasses may be displaced and replaced. The total volume of displaced gasses may be comparable to the volume of flow through the fill layer predicted by the groundwater model. A possible way of calculating the volume from the average change in the water table elevation for the shallow wells (approximately 2 inches over the fill area). A porosity could then be back calculated and compared to the continuous down hole logging performed by the USGS this past summer.

**15. Table 2-2.**

As previously stated, salinity which is reported in percent in the report appears to be a misprint and that the figures are accurate for parts per thousand.

Please check this and correct or advise. As pure seawater is on the order of 30 parts per thousand, it is doubtful that the groundwater at the landfill is over 100 parts per thousand.